

Introduction of Wind Power in Kisielice



Transferable Solution

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Project Title: Development of a Wind Energy Investment Project for the Municipality of Kisielice, Northern Poland –Wind Resource Assessment and Feasibility Study

Leader: Municipality of Kisielice, (Kisielice, Poland)

Partner: AWS Scientific, Inc. (Albany, NY, USA)

Location: Municipality of Kisielice, Poland

Project Duration: January 2000 – January 2001

EcoLinks Project Investment: Total Project Investment: \$67,352; EcoLinks Grant Support: \$50,000; Project Team Cost Share Contribution: \$17,352.

Best Practice: Transferable Solution

The project is a Best Practice because it successfully adapted a methodology for assessing wind resources under local conditions and created an investment plan to implement a wind power project in a small municipality in Poland. The methodology used for assessing wind resources and analyzing the feasibility of generating electrical power from wind can be easily transferred and used in other municipalities throughout Poland. Other countries may also benefit from applying a similar methodology depending upon the existence of favorable financial and regulatory conditions including the appropriate legal framework and the market price of energy.

Project Summary

Electrical energy production in Poland is traditionally based on coal combustion. The combustion of coal releases high levels of pollution in the form of carbon dioxide (CO₂) which contributes to global warming and the degradation of ambient air quality. Poland emits approximately 350 million tons of CO₂ per year. The importance of alternative energy sources such as wind and sun is increasing as Poland and other supporters of the Kyoto Protocol attempt to reduce emissions caused by fuel combustion. While Poland supports the expanded use of alternative energy sources, the country also needs to consider feasible investment strategies in alternative energy production and creative ways for implementing renewable energy projects. This project explores the technical and financial mechanisms necessary for developing a modern wind power station in the Municipality of Kisielice (popn. 6500) in northern Poland.

With support from an EcoLinks Challenge Grant, the Municipality of Kisielice, Poland and an American consulting firm, AWS Scientific, Inc. collaborated to develop a framework for implementing a wind power scheme for the Municipality of Kisielice. The project activities included: researching and assessing wind resources and wind power generation capacity in the Municipality of Kisielice; identifying financing sources; and developing wind energy investment guidelines.

The implementation of the wind power program developed in this project can lead to environmental and economic benefits. By using wind power as proposed in this project, for example, the following emissions from coal combustion are avoided: 1213.3 tons of CO₂ per year; 210 tons of CO per year; 4.6 tons of NO_x per year; 280.8 tons of SO₂ per year, and 3.9 tons of ash per year. The profits from selling wind-powered energy can add up to \$187,500 per year.

Project Activities

This project involved several activities that comprise an implementation framework for a wind power program for the Municipality of Kisielice. The activities are listed below.

1. Conducted start-up activities and identified wind power site

Action: Project partners convened to discuss roles, responsibilities and activities for implementation of the project. An on-site visit to the Municipality of Kisielice was made to select a possible wind measurement site and to identify a suitable location for a pilot wind turbine. Topographical data was collected. The final site was selected with safety considerations being a priority.

Product(s): 1) Test site 2) Topographical data.

2. Collected data on wind resources and meteorological conditions

Action: Wind measurement equipment was installed at the selected site. Data was gathered on on-site, local, short-term wind conditions including wind speed at 10 and 30 meters, wind direction, and the humidity and temperature of air. In order to assess the long-term local wind conditions, data was obtained from meteorological stations. The entire data set was recorded on a CD.

Product(s): 1) Wind monitoring station in the Municipality of Kisielice 2) CD with data on short-term and long-term wind conditions in the region.

3. Analyzed technical and legal parameters

Action: An assessment of the conditions necessary for connecting to the electrical grid was conducted. The assessment focused on the technical infrastructure, grid connections, possible wind turbine sites, and estimated energy production. Vector maps were digitized for incorporation into the larger data set. The legal and administrative requirements were researched and documented.

Product(s): 1) Context assessment 2) Digital terrain map for substantial part of the Municipality.

4. Evaluated wind resources

Action: Using a computer-based model of the terrain and conditions that influence wind potential, an evaluation of wind resources was conducted. It was determined that the Municipality of Kisielice has medium wind resources with an average wind speed of 6.2 meters per second at a height of 85 meters.

Product(s): Wind resources evaluation.

5. Prepared guidelines for investors

Action: Guidelines for investors were established. A publication titled, “Guidelines for Investors” outlining wind energy investment in Poland, including information on wind resources, conditions for investment, and administrative and legal parameters for wind energy investment by domestic and foreign investors. The publication also provides an overview of Polish policies and incentives for wind energy development.

Product(s): Publication “Guidelines for Potential Investors”.

6. Identified technological provisions

Action: Wind technology suppliers were identified and the most suitable supplier was selected. A list of wind technologies appropriate for Kisielice wind power generation was made and the optimal equipment was selected. One windmill was proposed for installation with the following technical parameters: power – 1500kW, height – 85m, blade diameter – 77m, energy production – 3600MWh/year.

Product(s): 1) Overview of wind technology equipment suppliers and supplies 2) Best windmill alternative.

7. Prepared and implemented feasibility study

Action: The feasibility of implementing a wind power program was investigated. An Environmental Impact Assessment (EIA) was done to review the environmental impacts of the proposed wind energy production program. The project costs were determined and an economic analysis was conducted. The following financial mechanism was outlined in a Draft Feasibility Report: 50% of the investment outlays from grants, 40% from a preferential loan at 8.6% interest rate with a repayment period of eight years, and 10% financing from municipal funds.

Product(s): 1) An Environmental Impact Assessment (EIA) 2) Draft Feasibility Report.

8. Prepared applications and initiated contact with financing institutions

Action: The appropriate applications were prepared and financing institutions were approached. Applications for financial support to implement the plan developed in this project were submitted to the EcoFund and the Polish National Fund for Environmental Protection.

Product(s): Applications for grants from EcoFund and the Polish National Fund for Environmental Protection.

Project Benefits

This project provides capacity building benefits and environmental and economic benefits. The wind power program developed in this project improved the collaborative capacity of the project participants as well as helped to improve knowledge about implementing wind power programs in Poland. Implementing the program outlined in this project can reduce harmful emissions and generate profits based on the amount of energy sold. The financial mechanisms for supporting the program are feasible.

Capacity Building Benefits

The groundwork for future collaboration on wind energy development activities in Poland was established. Successful technical information exchange was achieved between project partners. This information further builds the capacity for implementing similar projects throughout Poland leading to a potential increase in the use of wind power resources decreasing the reliance on coal.

Environmental Benefits

Several environmental benefits were identified in the Draft Feasibility Report developed as part of this project. Emissions from the combustion of coal are avoided

by implementing a wind power development strategy. The avoided emissions are as follows:

Table 1: Emissions avoided due to windmill operation in Kisielice

Pollutant	Emission avoided (t/year)
CO ₂	1213.3
CO	210
NO _x	4.6
SO ₂	280.8
Particles	3.9

Economic Benefits

This project provides economic benefits in terms of the profits generated from energy sold. Profits from energy sold amount to \$187,500 per year.

Table 2 presents the main financial data concerning the project:

Table 2: Kisielice Project – Financial data

Investment outlays	\$2 million
Grant	\$1 million
Soft loan (8.6%)	\$0.8 million
Municipality's budget	\$0.2 million
Operation costs	\$2 % of investment outlays
IRR after financing	9.23 %

The project has already been awarded a non-repayable grant by the Polish EcoFund for Environmental Protection that covers 30% of the investment costs. It can be expected that additional grant funds of 20-30% of the investment and preferential loans to cover a large portion of the remaining costs will be obtained from other institutions.

Lessons Learned

The following lessons were learned during this project:

- It is challenging to develop a financing scheme that would, under the current prices and regulations in Poland, enable realization of a renewable energy investment project based on sound market principles, i.e., without significant financial support in a form of a grant and soft loans.
- A wind resources assessment is an expensive process. Any previous analyses or rough estimates of wind potential in a given area should be carefully considered.
- This project confirmed that even small communities in Poland can develop and implement investment projects for the utilization of wind energy resources.

- Collaboration between project partners was improved through a close working relationship involving weekly correspondence through e-mail, and daily contact for the implementation of on-site activities and the transfer of documents, data, and results.

Contact Information

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